



3618  
8xw

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Application No. : 10/067,938 Confirmation No. : 8443  
First Named Inventor : Yutaka MATSUNOBU  
Filed : February 8, 2002  
TC/A.U. : 3618  
Examiner : F. Vanaman

Docket No. : 056203.49196DV  
Customer No. : 23911

Title : Hybrid Electrical Vehicle Employing Permanent  
Magnetic Type Dynamo-Electric Machine

**COMMUNICATION**

**Mail Stop Amendment**  
Commissioner for Patents  
P.O. Box 1450  
Alexandria, VA 22313-1450

Sir:

Enclosed is a copy of an Amendment as well as the papers filed in conjunction with authorization for extensions of time, which was inadvertently filed on March 21, 2005 with a serial number and filing date associated with the parent application of the above-identified application. Also, enclosed is a copy of the date-stamped postcard.

Applicants respectfully request that this Amendment be entered in the above-identified application instead of in the parent application (serial no.: 09/654,615). Applicants submit that a reading of the first page of this Amendment clearly indicates that it was intended to be filed the above-identified application as it reads "In response to the patent Office dated September 20, 2004 . . ."

This request is being made one day after the inadvertent filing with the incorrect serial number.

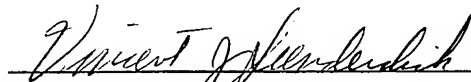
On another note, the check attached is for the payment of a two-month extension, but the transmittal authorizes the charging of any additional fees to Deposit Account No.: 05-1323 and that such response was filed along with the

proper authorization for payment in a timely fashion to avoid abandonment of the above-identified application.

If there are any questions or any further requirements, the Examiner is requested to contact the undersigned attorney at (202) 624-2838.

Respectfully submitted,

March 22, 2005

  
\_\_\_\_\_  
Vincent J. Sunderdick  
Registration No. 29,004

CROWELL & MORING LLP  
Intellectual Property Group  
P.O. Box 14300  
Washington, DC 20044-4300  
Telephone No.: (202) 624-2500  
Facsimile No.: (202) 628-8844  
VJS:ddd

Enclosures: Copy of Fee Transmittal Form filed on March 21, 2005  
Copy of Two-month Petition for Extension of Time filed on March  
21, 2005  
Copy of Amendment filed on March 21, 2005  
Copy of date-stamped postcard

#367161

# COPY

MAR 22 2005

PTO/SB/17 (12-04)  
Approved for use through 07/31/2006. OMB 0651-0032  
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE

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Effective on 12/08/2004.  
Fees pursuant to the Consolidated Appropriations Act, 2005 (H.R. 4818).

## FEE TRANSMITTAL For FY 2005

☐ Applicant claims small entity status. See 37 CFR 1.27

TOTAL AMOUNT OF PAYMENT (\$) 450

### Complete If Known

Application Number	09/654,615
Filing Date	September 7, 2000
First Named Inventor	Yutaka MATSUNOBU
Examiner Name	F. B. Vanaman
Art Unit	7893
Attorney Docket No.	056203.49196DV

### METHOD OF PAYMENT (check all that apply)

☒ Check ☐ Credit Card ☐ Money Order ☐ None ☐ Other (please identify):  
☒ Deposit Account Deposit Account Number: **05-1323 (Docket No. 056203.49196)** Deposit Account Name: **23911**  
For the above-identified deposit account, the Director is hereby authorized to: (check all that apply)  
☐ Charge fee(s) indicated below ☐ Charge fee(s) indicated below, except for the filing fee  
☒ Charge any additional fee(s) or underpayments of fee(s) ☒ Credit any overpayments  
under 37 CFR 1.16 and 1.17

WARNING: Information on this form may become public. Credit card information should not be included on this form. Provide credit card information and authorization on PTO-2038.

### FEE CALCULATION

#### 1. BASIC FILING, SEARCH, AND EXAMINATION FEES

Application Type	FILING FEES		SEARCH FEES		EXAMINATION FEES		Fees Paid (\$)
	Fee (\$)	Small Entity Fee (\$)	Fee (\$)	Small Entity Fee (\$)	Fee (\$)	Small Entity Fee (\$)	
Utility	300	150	500	250	200	100	
Design	200	100	100	50	130	65	
Plant	200	100	300	150	160	80	
Reissue	300	150	500	250	600	300	
Provisional	200	100	0	0	0	0	

#### 2. EXCESS CLAIM FEES

Fee Description	Fee (\$)	Small Entity Fee (\$)
Each claim over 20 or, for Reissues, each claim over 20 and more than in the original patent	50	25
Each independent claim over 3 or, for Reissues, each independent claim more than in the original patent	200	100
Multiple dependent claims	360	180

Total Claims	Extra claims	Fees (\$)	Fee Paid (\$)	Multiple Dependence Claims	Fee (\$)	Fee Paid (\$)
4	-20 or HP	x	=			
HP = highest number of total claims paid for, if greater than 20						
Indep. Claims	Extra claims	Fees (\$)	Fee Paid (\$)			
2	- 3 or HP	x	=			
HP = highest number of total claims paid for, if greater than 3						

#### 3. APPLICATION SIZE FEE

If the specification and drawings exceed 100 sheets of paper, the application size fee due is \$250 (\$125 for small entity) for each additional 50 sheets or fraction thereof. See 35 U.S.C. 41(a)(1)(G) and 37 CFR 1.16(s).

Total Sheets	Extra Sheets	Number of each additional 50 or fraction thereof	Fee (\$)	Fee Paid (\$)
- 100 =	/ 50 =	Round up to a whole number x	=	

#### 4. OTHER FEES

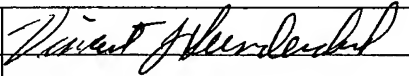
Non-English Specification, \$130 fee (no small entity discount)

Other **Two-month Petition for Extension of Time**

Fee Paid (\$)

\$450

### SUBMITTED BY

Signature		Registration No. (Attorney/Agent) 29,004	Telephone (202) 624-2500
Name (Print/Type)	Vincent J. Sunderdick	Date	March 21, 2005

This collection of information is required by 37 CFR 1.136. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 30 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.

If you need assistance in completing the form, call 1-800-PTO-9199 and select option 2.

#366825

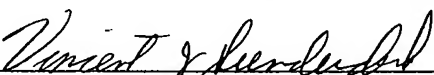
# COPY

MAR 22 2005

PTO/SB/22 (12-04)

Approved for use through 07/31/2006. OMB 0651-0031  
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE

Under the paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number.

<b>PETITION FOR EXTENSION OF TIME UNDER 37 CFR 1.136(a)</b> <b>FY 2005</b> <small>(Fees pursuant to the Consolidated Appropriations Act, 2005 (H.R. 4818).)</small>		Docket Number (Optional) <b>056203.49196DV</b>																									
Application Number <b>09/654,615</b>		First Named Inventor: <b>Yutaka MATSUNOBU</b>																									
For <b>HYBRID ELECTRICAL VEHICLE EMPLOYING PERMANENT MAGNETIC TYPE DYNAMO-ELECTRIC MACHINE</b>		Filed <b>September 7, 2000</b>																									
Art Unit <b>7893</b>		Examiner <b>F. B. Vanaman</b>																									
<p>This is a request under the provisions of 37 CFR 1.136(a) to extend the period for filing a reply in the above identified application. The requested extension and fee are as follows (check time period desired and enter the appropriate fee below):</p> <table style="width: 100%; border-collapse: collapse;"><thead><tr><th></th><th style="text-align: center;"><u>Fee</u></th><th colspan="2" style="text-align: center;"><u>Small Entity Fee</u></th></tr></thead><tbody><tr><td><input type="checkbox"/> One month (37 CFR 1.17(a)(1))</td><td style="text-align: center;">\$120</td><td style="text-align: center;">\$60</td><td style="text-align: center;">\$ _____</td></tr><tr><td><input checked="" type="checkbox"/> Two months (37 CFR 1.17(a)(2))</td><td style="text-align: center;">\$450</td><td style="text-align: center;">\$225</td><td style="text-align: center;">\$ <b>450</b></td></tr><tr><td><input type="checkbox"/> Three months (37 CFR 1.17(a)(3))</td><td style="text-align: center;">\$1020</td><td style="text-align: center;">\$510</td><td style="text-align: center;">\$ _____</td></tr><tr><td><input type="checkbox"/> Four months (37 CFR 1.17(a)(4))</td><td style="text-align: center;">\$1590</td><td style="text-align: center;">\$795</td><td style="text-align: center;">\$ _____</td></tr><tr><td><input type="checkbox"/> Five months (37 CFR 1.17(a)(5))</td><td style="text-align: center;">\$2160</td><td style="text-align: center;">\$1080</td><td style="text-align: center;">\$ _____</td></tr></tbody></table> <p><input type="checkbox"/> Applicant claims small entity status. See 37 CFR 1.27.</p> <p><input checked="" type="checkbox"/> A check in the amount of \$ <b>450</b> is enclosed.</p> <p><input type="checkbox"/> Payment by credit card. Form PTO-2038 is attached.</p> <p><input type="checkbox"/> The Director has already been authorized to charge fees in this application to a Deposit Account.</p> <p><input checked="" type="checkbox"/> The Director is hereby authorized to charge any additional fees which may be required, or credit any overpayment, to Deposit Account Number 05-1323. (Attorney Docket No. 056203.49196DV) I have enclosed a duplicate copy of this sheet.</p> <p><b>WARNING: Information on this form may become public. Credit card information should not be included on this form. Provide credit card information and authorization on PTO-2038.</b></p> <p>I am <input type="checkbox"/> the applicant/inventor.</p> <p><input type="checkbox"/> assignee of record of the entire interest. See 37 CFR 3.71. Statement under 37 CFR 3.73(b) is enclosed (Form PTO/SB/96).</p> <p><input checked="" type="checkbox"/> attorney or agent of record. Registration Number <u>29,004</u></p> <p><input type="checkbox"/> attorney or agent under 37 CFR 1.34. Registration number if acting under 37 CFR 1.34 _____</p> <div style="display: flex; justify-content: space-between; margin-top: 20px;"><div style="width: 45%; text-align: center;"> _____ Signature</div><div style="width: 45%; text-align: center;"><u>March 21, 2005</u> _____ Date</div></div> <div style="display: flex; justify-content: space-between; margin-top: 20px;"><div style="width: 45%; text-align: center;"><u>Vincent J. Sunderdick</u> _____ Typed Or Printed Name</div><div style="width: 45%; text-align: center;"><u>202-624-2500</u> _____ Telephone Number</div></div>					<u>Fee</u>	<u>Small Entity Fee</u>		<input type="checkbox"/> One month (37 CFR 1.17(a)(1))	\$120	\$60	\$ _____	<input checked="" type="checkbox"/> Two months (37 CFR 1.17(a)(2))	\$450	\$225	\$ <b>450</b>	<input type="checkbox"/> Three months (37 CFR 1.17(a)(3))	\$1020	\$510	\$ _____	<input type="checkbox"/> Four months (37 CFR 1.17(a)(4))	\$1590	\$795	\$ _____	<input type="checkbox"/> Five months (37 CFR 1.17(a)(5))	\$2160	\$1080	\$ _____
	<u>Fee</u>	<u>Small Entity Fee</u>																									
<input type="checkbox"/> One month (37 CFR 1.17(a)(1))	\$120	\$60	\$ _____																								
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<input type="checkbox"/> Five months (37 CFR 1.17(a)(5))	\$2160	\$1080	\$ _____																								
<p>NOTE: Signatures of all the inventors or assignees of record of the entire interest or their representative(s) are required. Submit multiple forms if more than one signature is required, see below.</p>																											

This collection of information is required by 37 CFR 1.136(a). The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.11 and 1.14. This collection is estimated to take 6 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.

If you need assistance in completing the form, call 1-800-PTO-9199 and select option 2.  
XXX:xx - (doc. no.)

#366829



IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Application No. : 09/654,615 Confirmation No. : 3618  
First Named Inventor : Yutaka MATSUNOBU  
Filed : September 7, 2000  
TC/A.U. : 7893  
Examiner : F. B. Vanaman

**COPY**

Docket No. : 056203.49196DV  
Customer No. : 23911

Title : Hybrid Electrical Vehicle Employing Permanent Magnetic  
Type Dynamo-Electric Machine

**AMENDMENT UNDER 37 C.F.R. § 1.111**

**Mail Stop Amendment**  
Commissioner for Patents  
P.O. Box 1450  
Alexandria, VA 22313-1450

Sir:

In response to the patent Office Action dated September 20, 2004, please amend the above-identified application as follows.

**Amendments to the Claims** are reflected in the listing of claims which begins on page 2 of this paper.

**Remarks** begin on page 5 of this paper.

**Amendments to the Claims:**

The listing of claims will replace all prior versions, and listings, of claims in the application:

**Listing of Claims:**

1. – 17. (Canceled).

18. (NEW) A hybrid electric vehicle comprising:

a transmission transmitting a forward rotation when receiving a forward rotation input and backward rotation when receiving a backward rotation input, respectively to a drive shaft side after changing speed;

a permanent magnet type dynamo-electric machine one side of which is connected to said transmission; and

an engine connected to another side of said permanent magnet type dynamo-electric machine so as to be separable from the other side of said permanent magnet type dynamo-electric machine,

wherein said permanent magnet type dynamo-electric machine comprises:

a stator having a stator core around which a stator coil is wound;

and

a rotor arranged in said stator by a rotational gap,

wherein said rotor comprises:

a rotor core having auxiliary protruding poles; and

a plurality of permanent magnets inserted to a permanent magnet insertion hole formed in an inner portion of said rotor core and arranged in an inner portion of said rotor core,

wherein said plurality of permanent magnets are inserted to said permanent magnet insertion hole so as to be arranged in a circumferential direction such that north poles and south poles are alternately arranged, and

wherein said permanent magnet insertion hole is inclined at a predetermined angle of incline ( $\theta$ ) in a circumferential direction such that a

shape of said rotor in the circumferential direction at each pole is asymmetrical, a ratio between a maximum torque in the forward rotation output by said permanent magnet dynamo-electric machine at a time when the hybrid electric vehicle moves forward and a maximum torque in a backward rotation output by said permanent magnet dynamo-electric machine at a time when the hybrid electric vehicle moves backward establishes a relation 1:1.05-1.2, whereby the maximum torque in the backward rotation of said permanent magnet dynamo-electric machine becomes greater, and a distance from said rotational gap in the forward rotation side becomes greater than a distance from said rotational side becomes greater than a distance from said rotational gap in the backward rotation side, whereby a magnetic flux density of said permanent magnet in the forward rotation side becomes lower than a magnetic flux density of said permanent magnet in the backward rotation side.

19. (NEW) A hybrid electric vehicle as claimed in claim 18, wherein said predetermined angle of incline ( $\theta$ ) is between 10 and 45 degree.

20. (NEW) A permanent magnet type dynamo-electric machine for a hybrid electric vehicle in which one side is connected to a transmission transmitting a forward rotation in the case that an input is a forward rotation and backward rotation in the case that the input is a backward rotation, respectively to a drive shaft side after changing speed, and the other side is connected to an engine so as to be separable from the engine, comprising:

a stator having a stator core around which a stator coil is wound;  
and

a rotor arranged in said stator by a rotational gap,  
wherein said rotor comprises:

a rotor core having auxiliary protruding poles; and

a plurality of permanent magnets inserted to a permanent magnet insertion hole formed in an inner portion of said rotor core and arranged in an inner portion of said rotor core,

wherein said plurality of permanent magnets are inserted to said permanent magnet insertion hole so as to be arranged in a circumferential direction such that north poles and south poles are alternately arranged, and

wherein said permanent magnet insertion hole is inclined at a predetermined angle of incline ( $\theta$ ) in a circumferential direction such that a shape of said rotor in the circumferential direction at each pole is asymmetrical, a ratio between a maximum torque in the forward rotation and a maximum torque in a backward rotation output establishes a relation 1:1.05-1.2, whereby the maximum torque in the backward rotation becomes greater, and a distance from said rotational gap in the forward rotation side becomes greater than a distance from said rotational gap in the backward rotation side, whereby a magnetic flux density of said permanent magnet in the forward rotation side becomes lower than a magnetic flux density of said permanent magnet in the backward rotation side.

21. (NEW) A permanent magnet dynamo-electric machine as claimed in claim 20, wherein said predetermined angle of incline ( $\theta$ ) is between 10 and 45 degree.

**REMARKS**

Reconsideration and allowance of this application are respectfully requested in view of the above Amendment and the discussion below.

Although Applicants invention has been discussed in the previous Amendment filed on June 4, 2004, the present invention has now been characterized by new claims 18-21 to further define over the outstanding rejection of claims 5, 7 and 9 as unpatentable over previously cited references to Kwakatsu (U.S. Patent No.: 4,335,429), Tadahiro et al. (JP 8-33246) and the newly cited and newly applied reference to Brown (U.S. Patent No.: 9,989,146) as indicated at item 3 on pages 2 and 3 of the patent Office Action. Claims 13-17 have been rejected over the combination of the above references and further in view of Fumio (JP 9-271,151) as indicated at item 4 on pages 3 and 4 of the patent Office Action.

The present invention, as defined by independent claims 18 and 20, is able to achieve a torque in the reverse direction which is higher than a torque in the forward direction similar to that of a conventional transmission having a forward and backward changing gear. However, the present invention achieves this relationship in a hybrid electric vehicle having a transmission with no forward and backward changing gear. This relation in the present invention is achieved by the permanent magnet type dynamo-electric machine, as claimed, wherein the essential feature is that the permanent magnet insertion hole is inclined at a predetermined angle in the circumferential direction so that the circumferential shape at each pole of the rotor is asymmetrical. Additionally, the distance between the rotational gap in the forward rotational side is greater than the distance from the rotational gap in the backward or the reverse rotation side and the magnetic flux density of the permanent magnet in the forward rotation side becomes lower than the magnetic flux density of the permanent magnet in the reverse rotation side.

Therefore, with the presently claimed invention, the ratio between the maximum torque and the forward rotation output by the permanent magnet dynamo-electric machine at a time when the hybrid electric vehicle moves forward and the maximum torque in the reverse rotation output by the permanent magnet at a time when the hybrid electric moves backward is a ratio of 1:1.05-1.2 so that the maximum torque in the backward rotation of the permanent magnet dynamo-electric machine becomes larger.

The reference to Tadahiro '246, in contrast to the presently claimed invention, discloses a rotor in which a permanent magnet is inserted in a permanent magnet insertion hole which is inclined downward in a rotational direction of a motor (forward rotation direction). This permanent magnet insertion disclosed in Tadahiro is inclined in this downward direction in order to intensify the magnetic flux of the permanent magnet in the forward rotation direction. Additionally, the leakage flux preventing hole is provided between the permanent magnets adjacent in the circumferential direction in order to prevent leakage flux from the permanent magnets.

As a result, in Tadahiro, the magnetic flux density of the permanent magnet in the rotational direction (forward direction) becomes higher than the magnetic flux density of the permanent magnet in the backward rotation so that the magnetic flux density of the permanent magnet in the forward rotation side does not become lower than the magnetic flux density of the permanent in the backward or reverse rotation side which is not only different, but exactly the opposite from the presently claimed invention. Therefore, Tadahiro has a maximum torque in the forward rotation direction which becomes greater than the maximum torque in the backward direction which is absolutely an opposite result than the presently claimed invention.

The present invention reduces the magnetic flux (effective magnetic flux) of the permanent magnet running into the stator side and the forward rotational direction in order to lower the magnetic flux density of the permanent magnetic, which is an entirely different concept from Tadahiro in which the leakage flux

preventing hole is provided for preventing leakage flux from the permanent magnet.

The reference to Kawakatsu '429 discloses a parallel type hybrid electric vehicle with no discussion or disclosure of the permanent magnet type dynamo-electric machine claimed in the present invention. Additionally, the '429 reference discloses a conventional transmission having both the forward and backward changing gear.

The reference to Brown '146 discloses a transmission for a four-wheel drive with a relationship whereby the torque for the backward drive is greater than the torque for the forward drive, but has no disclosure of a permanent magnet type dynamo-electric machine as described and claimed in each of independent claims 18 and 20. Claims 18 and 20 specify a hybrid electric vehicle having a permanent magnet type dynamo-electric machine connected to a transmission wherein the rotor of the machine has a permanent magnet inserted in a hole in order to be arranged in a circumferential direction so that the north and south poles are alternately arranged and this magnetic insertion hole is inclined at a predetermined angle of incline to provide an asymmetrical shape of the rotor with the ratio of the maximum torque in the forward direction and the maximum torque in the backward direction having a relationship of 1:1.05-1.2 so that the maximum torque in the backward rotation direction becomes greater and so that a distance from the gap in the forward rotation side becomes greater than the distance from the rotation gap in the backward rotation side to provide flux density in the forward rotation lower than flux density in the backward rotation.

Applicants respectfully submit that independent claims 18 and 20 clearly provide structure not shown or disclosed or made obvious by the references or their combination even if, for purposes or arguments, the references could be combined.

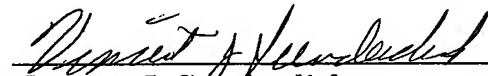
Accordingly, Applicants respectfully request that this application containing claims 18-21 be allowed and passed to issue.

If there are any questions regarding this amendment or the application in general, a telephone call to the undersigned would be appreciated since this should expedite the prosecution of the application for all concerned.

If necessary to effect a timely response, this paper should be considered as a petition for an Extension of Time sufficient to effect a timely response, and please charge any deficiency in fees or credit any overpayments to Deposit Account No. 05-1323 (Docket #056203.49196DV).

Respectfully submitted,

March 21, 2005

  
\_\_\_\_\_  
Vincent J. Sunderdick  
Registration No. 29,004

CROWELL & MORING LLP  
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VJS:ddd

#366773

**COPY**

Crowell & Moring LLP

Today's Date: March 21, 2005

Attorney Docket: 056203.49196  
First Named Inventor: Yutaka MATSUNOBU  
Serial No.: 09/654,615  
Filing Date: September 7, 2000

The following has been received in the U.S. Patent & Trademark Office on the date stamped hereon:

- X Fee Transmittal (in duplicate)
- X Two-month Petition for Extension of Time (in duplicate)
- X Amendment 1.111
- X Check No. 281163 in the amount of \$450

VJS:ddd

DUE DATE: March 21, 2005

